

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

APR. 14, 1952

50 CENTS

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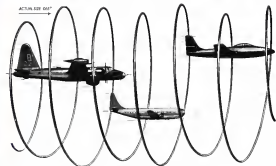


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T-3000-T-4000-5000-6000-7000-8000-9000-10000-11000-12000-13000-14000-15000-16000-17000-18000-19000-20000-21000-22000-23000-24000-25000-26000-27000-28000-29000-30000-31000-32000-33000-34000-35000-36000-37000-38000-39000-40000-41000-42000-43000-44000-45000-46000-47000-48000-49000-50000-51000-52000-53000-54000-55000-56000-57000-58000-59000-60000-61000-62000-63000-64000-65000-66000-67000-68000-69000-70000-71000-72000-73000-74000-75000-76000-77000-78000-79000-80000-81000-82000-83000-84000-85000-86000-87000-88000-89000-90000-91000-92000-93000-94000-95000-96000-97000-98000-99000-100000-101000-102000-103000-104000-105000-106000-107000-108000-109000-110000-111000-112000-113000-114000-115000-116000-117000-118000-119000-120000-121000-122000-123000-124000-125000-126000-127000-128000-129000-130000-131000-132000-133000-134000-135000-136000-137000-138000-139000-140000-141000-142000-143000-144000-145000-146000-147000-148000-149000-150000-151000-152000-153000-154000-155000-156000-157000-158000-159000-160000-161000-162000-163000-164000-165000-166000-167000-168000-169000-170000-171000-172000-173000-174000-175000-176000-177000-178000-179000-180000-181000-182000-183000-184000-185000-186000-187000-188000-189000-190000-191000-192000-193000-194000-195000-196000-197000-198000-199000-200000-201000-202000-203000-204000-205000-206000-207000-208000-209000-210000-211000-212000-213000-214000-215000-216000-217000-218000-219000-220000-221000-222000-223000-224000-225000-226000-227000-228000-229000-230000-231000-232000-233000-234000-235000-236000-237000-238000-239000-240000-241000-242000-243000-244000-245000-246000-247000-248000-249000-250000-251000-252000-253000-254000-255000-256000-257000-258000-259000-260000-261000-262000-263000-264000-265000-266000-267000-268000-269000-270000-271000-272000-273000-274000-275000-276000-277000-278000-279000-280000-281000-282000-283000-284000-285000-286000-287000-288000-289000-290000-291000-292000-293000-294000-295000-296000-297000-298000-299000-300000-301000-302000-303000-304000-305000-306000-307000-308000-309000-310000-311000-312000-313000-314000-315000-316000-317000-318000-319000-320000-321000-322000-323000-324000-325000-326000-327000-328000-329000-330000-331000-332000-333000-334000-335000-336000-337000-338000-339000-340000-341000-342000-343000-344000-345000-346000-347000-348000-349000-350000-351000-352000-353000-354000-355000-356000-357000-358000-359000-360000-361000-362000-363000-364000-365000-366000-367000-368000-369000-370000-371000-372000-373000-374000-375000-376000-377000-378000-379000-380000-381000-382000-383000-384000-385000-386000-387000-388000-389000-390000-391000-392000-393000-394000-395000-396000-397000-398000-399000-400000-401000-402000-403000-404000-405000-406000-407000-408000-409000-410000-411000-412000-413000-414000-415000-416000-417000-418000-419000-420000-421000-422000-423000-424000-425000-426000-427000-428000-429000-430000-431000-432000-433000-434000-435000-436000-437000-438000-439000-440000-441000-442000-443000-444000-445000-446000-447000-448000-449000-450000-451000-452000-453000-454000-455000-456000-457000-458000-459000-460000-461000-462000-463000-464000-465000-466000-467000-468000-469000-470000-471000-472000-473000-474000-475000-476000-477000-478000-479000-480000-481000-482000-483000-484000-485000-486000-487000-488000-489000-490000-491000-492000-493000-494000-495000-496000-497000-498000-499000-500000-501000-502000-503000-504000-505000-506000-507000-508000-509000-510000-511000-512000-513000-514000-515000-516000-517000-518000-519000-520000-521000-522000-523000-524000-525000-526000-527000-528000-529000-530000-531000-532000-533000-534000-535000-536000-537000-538000-539000-540000-541000-542000-543000-544000-545000-546000-547000-548000-549000-550000-551000-552000-553000-554000-555000-556000-557000-558000-559000-560000-561000-562000-563000-564000-565000-566000-567000-568000-569000-570000-571000-572000-573000-574000-575000-576000-577000-578000-579000-580000-581000-582000-583000-584000-585000-586000-587000-588000-589000-590000-591000-592000-593000-594000-595000-596000-597000-598000-599000-600000-601000-602000-603000-604000-605000-606000-607000-608000-609000-610000-611000-612000-613000-614000-615000-616000-617000-618000-619000-620000-621000-622000-623000-624000-625000-626000-627000-628000-629000-630000-631000-632000-633000-634000-635000-636000-637000-638000-639000-640000-641000-642000-643000-644000-645000-646000-647000-648000-649000-650000-651000-652000-653000-654000-655000-656000-657000-658000-659000-660000-661000-662000-663000-664000-665000-666000-667000-668000-669000-670000-671000-672000-673000-674000-675000-676000-677000-678000-679000-680000-681000-682000-683000-684000-685000-686000-687000-688000-689000-690000-691000-692000-693000-694000-695000-696000-697000-698000-699000-700000-701000-702000-703000-704000-705000-706000-707000-708000-709000-710000-711000-712000-713000-714000-715000-716000-717000-718000-719000-720000-721000-722000-723000-724000-725000-726000-727000-728000-729000-730000-7310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**SKYHAWK.** Most of the flight crew of the big Douglas X-45A Stealth. The single-seat Navy carrier-borne attack bomber has an M58C-7 turbofan of approximately 5,000 hp, turning three-blade composite. Round thrust exhausts from large port behind wing.



## Military Planes In the News

**FURY CLOSEUP**—Prototype North American X-45B Fury (left) in Navy point. Canadian version of USAF's F-35 Sabre, the F12 has a GE J47 of over 9,000 lb. thrust, is armed with four 30-mm cannons.

**SAVED BY SKIS**—Lockheed F-40C (below) decelerated in Alaska, but small ice sheet temporary did to permit takeoff and flight back to its base. USAF says this bit of emergency saved approximately \$250,000.





## THIS YOKE... for jet engine condensate drainage is a result of Flexonics Engineering

Among the many complicated aircraft components fabricated by Flexonics Corporation is the condensate-drainage yoke illustrated above. The purpose of the yoke is to drain unwanted fuel that has condensed after a short down on the power plant.

It's an intricate device, combining flexible stainless steel hoses, stainless steel tubing and special connectors. Flexonics engineering makes it possible to manufacture these yokes on a production basis to rigid specifications.

Other recent components manufactured by Flexonics Corporation include hose at all deceleration, bellows, air and fuel lines, ducting and connectors of all types and many special assemblies. We would welcome the opportunity to discuss your requirements with you. For recommendations read us online or your needs.

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## WHO'S WHERE

### In the Front Office

Robert McCulloch has been elected president of Truett-McCulloch Corp. (formerly called Truett Engineering & Manufacturing Co., Inc.) Dallas, Tex. Also elected was Bill L. Howard, executive vice president treasurer. John A. Maxwell, Jr., vice president manufacturing. Clyde Williams, vice president controller. Lathan Lewis secretary. Howard was also elected president of Truett's subsidiary, Lathan Lewis Aircraft Corp. Dallas. McCulloch was named executive vice president treasurer and Clyde Williams was named executive vice president.

Mr. Gen. Edward M. Powers, USAF (ret.), vice president engineering of Curtiss-Wright Corp., has been appointed general manager of Wright Aircraft Division according to T. B. Fuchs, who resigned Powers joined C-W in June 1981 after retirement as Assistant Deputy Chief of Air Staff National.

### Changes

John H. Spink has been named to the newly created post of purchasing manager of Hamilton Standard Systems, General Aircraft Corp. F. Hamilton Corp. His former position as district manager is held by Herbert W. Bell. Robert A. Agnew has been placed in the new post of assistant general manager of Sikorsky Aircraft Division of CAC. Paul W. Hall replaces Agnew as district manager.

Lawrence C. Buehl has been designated sales manager in the Midwest area for Adair division of General Motors Corp. He has worked with CAC in Truckline division and has been with Wright Aircraft Division.

Mr. Harold Sir Ronald, Vice-Chairman has been appointed Air Officer Commanding in Chief, Home Command RAF. Air Vice-Marshal Francis J. Fennington has been designated Assistant Chief of Air Staff (Intelligence) RAF.

Hal Kay has been appointed public relations director for Hamilton Standard. He has been editor of the Pitt Aviation Magazine and Pan American Traveler.

J. Bruce Winkler has been appointed Northwest Airlines director of sales administration. D. J. Mahan has been promoted to director of travel schedules and ticketing research. R. E. Moore has been designated manager of schedules and J. A. Albrecht is manager of fleet.

Robert C. Cohen has been designated manager of Fibreco Inc. Armstrong Corp. a Jackson, Mich., subsidiary. Cohen joined Armstrong in 1981 as sales manager.

Robert C. Perry has been named assistant to the president of Record Aviation and will also act as the owner's Washington D. C., representative.

James M. Gillette has returned to Alfa Romeo Manufacturing Co.'s export department. For the past year he has been engaged in the Caterpillar Corp. as consultant on Alfa Romeo's export.

## INDUSTRY OBSERVER

►Dashfleth's new buying C-119H (Aviation Week, July 30, 1981, p. 17) is due to make its first flight at Hagerstown, Md., early in May. Meanwhile, Fairchild development on the XC-120 detachable pack version of the Packard contract, now under contract, the detachable pack will be available with a tractor-trailer hitch for further ground mobility.

►Navy leads tell Congress that the attrition rate on Navy aircraft since between 1970 and 20% a month and has not varied appreciably as a result of Korean coastal operations. Legions of combat losses is attributed to lack of reserves on opposition in the close support and interdiction missions flown. Meanwhile, USAF Silver Falcons are working off the Korean-built MIG-21s from the slower Navy planes as well as from the slower USAF fighter bombers. Navy does not yet have operational in Korea a plane which will attack the MIG-15 performance, but testified it will have in production the next year about seven models that are "improves."

►Air Force will withdraw all F-7, F-8 and C-45 aircraft in the Air Force inventory in a C-400 configuration. This withdrawal requires a new, using study-schedule, new leading edge, reduction of engine installation, redesign of the tail assembly, new cockpit and cabin configuration and new communications equipment.

►Air Force is ordering approximately 4,300 drapery parachute from Pioneer Parachute Co., Minneapolis, Conn., at a total contract cost of \$6,164,000. The drapery, which cost \$1,405.99 each, are used to make the Boeing B-47 landing air. Air Force figures the life of each parachute at providing 15 landings. This means it costs about \$160 per landing to bring the B-47 to a halt on ground recovery. In the first seven and one-half months of fiscal 1982, B-47s made 2,500 landings, AF estimates.

►Air Force is ordering a substantial number of General Electric engines for training K-1 system bombardiers. The B-7 version will be equipped with Albion T-50 turboprop engines.

►In a reversal of Royal Air Force policy, quantity orders will be placed for either or both of Britain's new all-weather fighters, the following Gloster GA-5 and the two-bombers de Havilland 149. RAF had ordered only one of each for prolonged comparison trials. Speculation is that RAF has the made track for orders because of the more conventional overall design of the 149.

►Air Force has ordered 14,835 General Electric [47-GE-25 engines out of fiscal 1972 funds for maintenance and spare parts. The Boeing B-47B jet bomber. Spares are currently being at 200% per plane and are scheduled to be reduced to 100% yearly average by end of fiscal 1975.

►Navy estimates that all three of its first carrier types—Essex, Midway, and the Independence—have spent the budgeting year, 1980, spent about 32 knots. Although the Essex-class will have 50,000-mile displacement as compared to 45,000 tons for the Midway, the new carrier flight deck will be only 65 ft. longer, with an overall length of 1,435 ft.

►Possible test of a future development at Republic Aviation Corp. President Henry Ford has on his desk a model of a two-place F-44 labeled "F-44" (both military and military versions may have been committed on the fact that the U.S. has only one jet trainer, the T-38, which also was developed from a jet fighter, the Lockheed F-8).

►Victor Valiant II, second prototype of the Royal Air Force's Avon-powered intercept bomber which is slated for early flight, will differ from first prototype, which carried four jets. Major difference is said to be in wing design. Expect that the changes may be in wing, the fact that Valiant is continuing performance out to one piston of the Valiant I to illustrate changes on the Valiant II.











## A Crash in Heavily Populated Queens . . .



## Brings New Problems for Safety Group

Pellic's entry in the New York metropolis area against airports located near residential areas had begun to set off. The Port of New York Authority, with approval of cities adjoining Newark Airport, had agreed to acquire that field for limited military use.

Two days later, early on a hazy, foggy Saturday morning, a C-54 cargo plane owned by U. S. Airlines crashed in approach to Idlewild Airport and plunged into the heart of the Borough of Queens, narrowly missing large apartment buildings (see photo), and killing the two men crew and three persons on the ground. It was the fourth crash into residential sections of the New York area since December.

◆ **Demand Closing Fields**—Immediate reactions were centered demands to keep Newark, that higher end, in the long run, close down both Idlewild and La Guardia Field. The crash, plus public reaction, brought a hurried special session of the National Air Transport Co-

ordinating Committee, of Capt. E. V. Richardson (shown, pointing, in the lower photo with American Airlines' C. B. Smith, left, Port Authority executive director Austin T. Kahn, and Air Line Pilots Ass'n's A. F. Finney). After the meeting, Richardson and everyone concerned was cooperating "to determine the exact facts as rapidly as possible."

The facts of the crash still were fairly sketchy. The plane released from Florida was making an instrument approach over Jamaica Bay, south of the field. Tower gave Pilot William Cook, left, in reported weather of 10 minutes previous—visibility 900 ft, visibility one to one and a half miles. The pilot reported at 3,500 ft and asked for a straight-in approach to Idlewild.

◆ **Instrument Approach**—He was cleared for instrument straight-in approach and instructed to report at 2,500 ft, which he did. He was told to line up Runway 4, the instrument runway, and make a left

turn to land on 13L, the runway into the wind. He was instructed to report visual contact over the ridge station, which he did.

On his approach, the passenger approach radio tracked him as coming in via contact at 300 ft. He was told to make his turn to land on 13L. He missed his approach, was ordered to make a right turn and pull up to 1,500 ft, over the ocean and went down for another pass. He was seen to head north at the airport at about 700 ft. The plane crashed two miles north of the F.A.I.

## P&W Confirms Ford J57 License

Pratt & Whitney Aircraft last week confirmed its earlier USAF announcement (Aviation Week Feb. 4 p. 15) that a licensing agreement is being negotiated for Ford Motor Co. to build the new Pratt & Whitney-designed J57 jet engine at the Chicago Ford Aircraft Engine division plant.

Ford's design has started to make J57 components at its Dearborn plant for Pratt & Whitney's earlier J57 powered aircraft. The Ford license is called the result of increased interest demand for the engine by numerous jet engine, which has been modified rated at around 10,000 lbs thrust.

It already has been designated as potential for the two competitive engine layouts: Boeing X-15 and Convair YB-60.

The J57 also is unofficially reported to be the powerplant staged to the North American F-100 up, around \$10m, and to the Convair X-102 delta-wing missile-carrying interceptor. There is speculation it also will go into the forthcoming low jet version of the Boeing B-57 medium bomber after the prototype, which will replace X-100 J71 engines.

## AEDC Delays Worry House Committee

House Appropriations Committee has taken as subject in the lag in development of facilities at the Arnold Engineering Development Center at Tullahoma, Tenn.

An Air Force says it urgently needs the facilities for testing plans already in production and the committee is trying to find the cause of delay.

◆ **High-altitude engine test chamber** won't be completed until May 15, 1955. A year ago, it was scheduled for completion this month.

◆ **Supersonic propeller wind tunnel** won't be operational until early 1957. A year ago, it was due for completion by early 1954.

# VISIBILITY



# by Swedlow

## in the F-86 Sabre Jet

Smashing victories over Red MIG-15 jets have marked the performance of America's top line North American Aviation F-86 Sabre jet fighters in combat service with the Air Force over Korea.

The optical properties of its SWEDLOW-made transparent enclosures contribute much to the split-second timing by pilots so vital in this type of aerial contest.

SWEDLOW brings to the production of today's speedier aircraft, where precision more than ever counts, ten years of specialized experience in the precision engineering and production of extrudomes, canopies and other acrylic parts.

Three plants in California and the centrally located plant in Ohio are now at the service of the aircraft industry with duplicated facilities and tooling and a precautionary measure for any emergency.



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LEAR—ROMEC CONTROL PANELS and Pressurizing Kits . . . precision manufactured to U. S. Air Force specifications . . . were selected for use in bomber, transport, cargo, and fighter planes of America's leading manufacturers—and by electronic equipment manufacturers for ground radar installations.

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## PRODUCTION ENGINEERING

### GE Cuts Bottlenecks at New Jet Center

- Lockland works on new ideas and new techniques.
- Next decade may exceed 'fastest' one just past.

By David A. Anderson

Lockland, Ohio—Born ten years ago of war's necessity, General Electric's recent gas turbine business is now a healthy, thriving, leading branch in the demands of current engines.

And judging on today's strength and tomorrow's projected growth, the next decade should see a business of powerful growth.

Like any proud parent, GE showed off the prodigy on its tenth birthday and bragged a little about abilities and accomplishments. To help celebrate the occasion, GE invited industry, the military, and the aviation press.

■ Jet Center, USA—When GE's new jet center is completed, there will be just about 4 million sq. ft. of factory, office and administration space. Lockland will become one of the largest jet engine areas in the world, and from its offices will move thousands of the cylindrical steel cans which house the J45 and will carry the J75 and later engines.

From Lockland will flow the orders to more than 4,000 suppliers and subcontractors who backstop GE's jet program. About 50% of the engine work is subcontracted; about 50 runs out of every dollar GE receives goes directly out again to suppliers.

■ Fast History—It was on May 18, 1942, that the first GE-built jet engine made its initial test run. Speeding along as a single Whittle engine received from England six months before, the GE gas turbine was designated for Type I-A and rated at about 1,500 lb. thrust. It weighed less than 500 lb., complete with accessories. It had a centrifugal compressor with a double inlet, and a single-stage turbine. Specific fuel consumption was 1.35 lb./hr./lb. thrust.

The J47-GE-27, shown publicly for the first time at the birthday celebration, produces over 5,500 lb. of thrust and weighs close to 3,100 lb. Specific fuel consumption is probably better than 1.05 lb./hr./lb.

The Type I-A flew for the first time on Oct. 2, 1942, in the two power plants of the Bell XP-59A Acecomet.



BASIC J47 TURBOJET, shown here in cutaway, is the foundation for a whole family of engines. Several variants of the J47 are in high production at GE.



MONITORING: Testing control room is one of the features of the Lockland jet center.

first jet aircraft produced in the U. S. (The United States was the third nation in the chronology of jet flight. The first was Germany, which Heinkel 178 first flew Aug. 27, 1939. The British flew the Gloster E28/39 on May 15, 1941.)

The J47 was badly damaged in its initial proving runs when GE engineers began studies of the J14 (occasionally called J45) to be rated at 1,400 lb. thrust. This was followed rapidly by the J16, J18 (which was a development engine only) and the J33. All

these engines went through test runs within two years of the first run on the Type I-A.

■ New Design—These were all developments engines, based on British ideas and in some cases, directly copied from them. But the GE people felt that they could make original contributions to jet engine progress, and early in 1945 began the design of two new engines. Both were to be rated at 4,000 lb. thrust, a big jump from the 2,800 lb. of the J20. One engine, bearing the company designation of J-40, was to



**BLADE FORGING BOTTLENECK** is attacked by GE with new method of fabricating compressor stress blades. New cast (left blade in left photo) is compared with old forged blade. New blade has been rolled into form. It then is shipped into closed ring (right).



as a centrifugal compressor; the other, called the TG-184, was to use an axial compressor. In later days, these designations were to be changed, the T-49 became the J33 and the TG-180 became the J35.

First flight of the J33 was in a Lockheed XP-80A; it took off on June 10, 1944. The J35 was flown two years later in the first prototype Republic XF-84 Thunderbolt. Both engines were accepted for production by the Air Force.

At war's end, production responsibility for these two engines went to the Allison division of General Motors Corp. In considerably improved variants, they are still in high production at Allison.

► **Boeing Engine**—Shortly after the war, another engine went into development at GE, it was the J47, designed to use the turbojet engine for a whole line of turbojets. The J47's maiden flight came in 1948, with the first test by of the North American XP-86 Sabre. From this experimental installation in a twin lighter, the J47 has gone on to power the later Sabre in all the F-106 modifications.

It also is the powerplant for the Boeing B-47 and the North American B-45 bomber variants, the Republic XP-41 interceptors and the Martin XB-58 light bomber. Four of these engines are pointed in the Convair B-36 bombers for extra power above that of the six piston engines.

Currently in production is a host of variants, the J47 is being built at GE's Lynn, Mass., and Lockland plants, and is to be made under license by the Shinkuhara Corp. and the Fushida Motor Co. Co.

Thrust rating of all the J47 models is given cryptically as "over 5,200 lb," which is not least little thrust. Basic thrust length of the engines is 34 in. (less any afterburner), and diameter is about 36 in. Total weight with accessories varies from 3,140 lb. to about 3,800 lb., depending on the engine model. Specific fuel consumption is given for one engine (and is probably typical of the lot) as 1.65 lb./hr./hp.

► **New Models—Latest version** of the new J47 engines, the -27, was awarded for the first time during the last anniversary celebration (Aviation Week, May 31, 1952, p. 18).

The -27 is slated for installation in North America's new F-102F Sabre and F-102F Jet, scheduled for subsonic production at the Columbus, Ohio, plant of NAA.

Only information on thrust rating of the new engine is that it puts out about 94% more thrust than the J47 powering the Sabre in Korea. (The J47 now in combat use is the -13, one of the "over 5,200 lb." engines.)

New features of the -27 are in the



**Intermediates** Autopositives' intermediates are used in place of direct drawings which would otherwise be exposed to constant wear and tear. These intermediates—soft down photographically black lines on a durable, white paper base—produce sharp blueprints when exposed.



**Home-testing film** The operators and sales engineering drawings for Kodagraph's alpha plates in Syracuse, Detroit, and Boston (Boston) are prepared by the home-office staff in Syracuse, N. Y. They demonstrate intermediates, which have the leading qualities of photo graphics, not much for future literature and production improvements.



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## Kodagraph Autopositive Paper

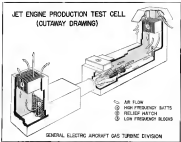
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### QUESTION

How is a jet fighter's instrument affected by a cascading shock to the skin and of 4,500 feet?

### QUESTION

What is the useful life of a satellite in the changing heat of the South Pacific jungle?

The answers to these and dozens of other questions will be worked out by RCA Engineers from test data obtained in an atmospheric test chamber designed and built by Tenney Engineering, Inc. This 10-ton chamber has been installed for the RCA Engineering Products Department, Camden, N. J., for environmental testing of both military and civilian electronic equipment.

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auxiliary system. High altitude starts have been improved by the use of a higher-voltage d.c. ignition system using opposite polarity, enlarged manifold tubes (jet engine), the revolution post on from chamber to chamber after ignition on one of them) and revised fuel regulator control to get the very low fuel rates required at altitude. Oil specimens and that altitude starts can now be made up to 40,000 ft.

Internal reworking, using hot oil bath from the -27. And eight stations have been incorporated on the engine.

Aerodynamic change in the basic compressor design inside the fast-stage blades longer for increased air handling and as increase in compressor pressure ratio. Completed only this has been some improvement in the specific fuel consumption.

The -27 is now in production at GE's Lima, Mass. plant, and will get into production at Lockheed shortly. It is one of the company's high production program engines.

■ **First Test-A** will through the relative quiet of the Lockheed production area is important. Right now, there are lots of new machines, some still on track in run.

There is also a lot of open and new production space. That's to be expected, because Lockheed is still under-estimating. The entire layout has been planned for high production, now, making it still underway. The 7,500 employees now stay in the factory will soon number 12,000.

Types of the specialized tools acquired for the complex processes of ten-foet manufacturing is the Allen drill. This machine has 16 work stations and 17 working heads. In this, specific, coordinated combinations and tips all the holes on the J47 frame compressor frame. The frame is set up on a travel way bed and moved down by hand, here automatically under each of the seven sets of heads. According to GE, the operation takes one-eighth the time for equivalent work done on a lathe drill.

■ **Pulsed Blade-Git** is avoiding the blade being bottlenecked by dragging compressor rotor blades for lubrication. **Power** was developed at the company's Thomson lab at the Lima works and represents a revision to stress before practice.

In the new process, rotor blades are rolled in long strips, contained to proper action and then cut to length. Blade bars, previously dovetailed to fit into a ring, are now relieved. Now it has an opening for blade insertion and welding, and in addition, the base has been expanded so that it now functions as the blade ring as well as blade base.

This method of fabrication has been

(Continued on p. 29)

## CLEVELAND PNEUMATIC—pioneers and leaders in Aircraft Landing Gear



### This "indoor landing field" insures top performance in landing gear

Cleveland Pneumatic engineers use this "Spit-Up" Drop Test equipment to simulate closely actual aircraft loadings. With wheels rotating at high speed, the gear is dropped to produce the impact and strains encountered when airplanes touch the ground. By such special tests, the engineers can verify their calculations on new gear designs and often further refine them.

This test is only a part of Cleveland Pneumatic's complete laboratory facilities, which also include the finest in metallurgical control.



This is the old landing gear for the Boeing B-47

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Here was the actual test results on a typical production run at Hubbard & Company. At left is the failed washer ready for delivery. Middle picture shows the washer after the 30" test had required by specification. At shown at the right, Hubbard spring washers was successfully withstand a total test far greater than required.



At Hubbard, this variable speed conveyor removes spring washers from the quench tank, to a position where they, then, the washers enter a low temperature rotary furnace.



This rotary furnace removes the oil and exposes desired temperature integral prior to heat tempering.

# LEAN ALLOY STEEL YOU'RE GETTING Carilloy spring washers used without one reported failure!

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HUBBARD & COMPANY, Tool Division, Pittsburgh, Pa., is a major producer of rail joint spring washers. These vital washers are used on the bolts of the joint bars that connect sections of railroad rails. They prevent the bars from "loosening" and interfering with expansion and contraction of the rails. Rusting and wear at the rail ends is reduced due to the high bolt tension caused by the reactive pressure of these CARILLOY steel washers.

You could hardly find worse service conditions. Temperatures often vary 50, 60, even 70

degrees in a single day. And, because they are part of the rail joint, these washers must endure the wheel load shock of trains that every day become longer, heavier and faster.

Some time ago, our metallurgists got together with Hubbard engineers and came up with a vastly improved method of heat treating these alloy steel washers. This heat treating system has achieved uniform heating, precisely timed quenching and full proof tempering. Result: a higher quality product, more uniform than ever before.

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### "Failure reports have stopped"

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"Since installing our new heat treating system, we've sold about 18,000,000 spring washers without one reported failure."

"These washers have exceptionally high and uniform mechanical values. After they are compressed, these washers return to their original contour while retaining their spring properties. We think the superior performance is due to our improved heat treating system."

If you're having trouble handling less alloys, we may be able to suggest heat treatment methods that will give you more uniform hardness, less rejects and less adjustments. Simply call or write our nearest district sales office.

like to make sure that we meet and exceed railroad standards.

"These washers have exceptionally high and uniform mechanical values. After they are compressed, these washers return to their original contour while retaining their spring properties. We think the superior performance is due to our improved heat treating system."

If you're having trouble handling less alloys, we may be able to suggest heat treatment methods that will give you more uniform hardness, less rejects and less adjustments. Simply call or write our nearest district sales office.

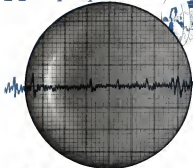


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a propeller with the stamina to handle  
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*But the solution was not clear—*  
for at times it seemed impossible to design  
a propeller that would provide the ruggedness and stamina  
that we had set as our goal.

Aeroproducts engineers, however, did find the answer.  
Part of it lay in design. Part of it was in Aeroproducts' continuing research  
on processing methods, materials, and means of quality control.  
The result? A great new Aeroprop that will soon rule the skies  
on some of America's finest military planes—the F5Y, B57, A2B, and others.

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is available to assist you in solving your propeller requirements,  
whether in substance, tonnage, or supersonic range.

*Building for today  
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## Aeroproducts

AEROPRODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO



NOSE DOWN, jet goes down green line.

(Continued from p. 24)  
approval for the more than 1,500 rotor  
blades in the 147 compressor, rotor  
blades, which are loaded heavily by  
centrifugal force, will continue to be  
forged for the present.

► **Pressure Control** Cages/center  
timers in the Sheffield Pressomatic,  
a pneumatic gasping device for blade  
control. Pressure pistons in the jet  
engine bearings has been to use a series  
of pulldown gears to check each blade.  
This is because, in operation, rate of  
one blade per minute was quoted by  
GE for the tail.

With the Sheffield device, an  
operator can inspect ten blades each  
minute. Each blade is changed in a holding  
fixture and a test pedestal runs a  
series of roller gears against the blade  
surface. The operator looks at an  
optical chain—a series of glass tubes against  
a white background—with two halogen  
lamps marking limits for upper and  
lower blade clearance tolerances. A series  
of little holders are suspended in  
the glass tubes and are free to rise and  
fall under air pressure variations. When  
all the holders lie between the limit  
lines, the blade is acceptable.

► **Line Methods**—GE's current assembly  
practice: It is to run engines through a  
"green" assembly, test them, test them  
down, inspect, and assemble on the  
final line. After final assembly they are  
spun run and shipped.

The engines are assembled vertically  
on the green line. Fixtures are designed  
to stand the engine on its nose. Major  
issues in the elements the multi-tag in  
the long time resulting from horizontal  
assembly. Secondary advantages are  
space saving and accessibility.

The reason for starting with the horizontal  
assembly on final line was co-

## Right kind of a let down



**Heavy** bombers, fast bombers of 1952 vintage will let  
down with complete confidence on these Well-Cast  
magnesium wheels.

More years than we care to think about have proven  
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These Well-Cast wheels and the wide range of other  
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Remote Operator Control Panel



Installed on Wind Cutter and Wind Tee



Crouse-Hinds Wind Tee sensors continuously day and night indication of wind direction or general landing direction. It can be installed either on a single mast or on a separate mast, only as with accessories which make it completely automatic or controlled by a remote operator.

The wind tee gives the appearance of a scale with "T" when viewed from above at night and a single stroke "m" when viewed from above in the daylight.

- Standard Free Floating Wind Tee:** Responds only to flow of air. Constructed to meet CMA Specification L 125.
- Standard Free Floating Wind Tee with Positive Indicating Transmitter:** Responds only to flow of air. Shows position indicator system shows true position of tee to operator in control tower.
- Wind Tee Complete with Automatic No-Wind Return and Positive Indicating Transmitter:** Responds only to flow of air above predetermined low velocity (about 10 mph). The actual velocity is adjustable between 5 and 15 mph. When wind drops below this critical velocity, it automatically returns the tee to the predetermined no wind position (usually the preferred direction on the longest or preferred runway). The predetermined no wind position is permanently in the base of the tee. The tee is held in the normal position until the wind velocity exceeds the return velocity which opens back freely with the wind. The tee is complete

with always positive indicating transmitter

- Wind Tee with Operator Control and Signal Position Indicating Transmitter:** Tee responds to remote operator action, when wind velocity is below rated velocity. When wind exceeds the rated velocity, return is automatically disconnected from the control and the tee automatically returns to the wind, preventing damage to the tee in strong winds. Tee is complete with safety position indicating transmitter.
- Combination Wind Cutter and Wind Tee:** It is always desirable to have a wind cone in combination with a wind tee. The wind cone is extremely sensitive and indicates wind velocity and true wind direction at all times. The addition of the wind cone is particularly recommended for the emergency controlled tee and the no-wind return tee. If the wind cone and wind tee are mounted adjacent to each other on the ground, the plane view of the tee is obscured by the wind cone at various angles. When the wind cone is mounted on top of the wind tee, a just one quickly and easily determines the true landing direction and also the actual behavior of the wind.

**Special Features:** A floating mechanism and control cone is added to the wind tee arm to provide operation at the light when steady blowing is slackening. Red lights can be furnished in addition to the green lights on the wind tee, which is constantly directed for traffic control.

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planned by the "roving" which takes place during run-up. Even the bearings and shafts have made their own alignment, and the problem of assembly alignment simply vanishes.

GE's pilot customers have paid attention to details, too. Take the overhead chain hoist. This type of hoist, used just about everywhere in industry, has two chains to tapes hanging down. You pull on one, and the lower lifts, haul the object, and the hoist lowers. But which line is which, is never clearly indicated. At GE, the line handles are little wooden arrows, one pointing up and the other down. Turkey by night, or fog, you know which direction the hoist is going when you hold the line.

• **Testing.** Two things define the design of engine test cells—engine performance and neighborly considerations. GE has built 35 test cells at Lockland, with built-in factors in.

An experimental cell was first built and tested at the company's Lynn plant and served as a model for the series at Lockland. In designing the cell, GE engineers developed a special constant with sound-dampening qualities. This constant, plus vibration air aggregate and a filter of hard ducts, makes the cells capable of taking temperatures over 1,000°. Cracking concrete begins to deteriorate at temperatures above 700°.

Blocks and houses remove a lot of the noise. At both ends of the cell, there are high-frequency sound-absorbing steel and some glass grids—which absorb most of the compression waves and exhaust howl. And there are blocks of aluminum cement-to absorb low frequencies—at the exhaust end.

Cells are 114 ft. long. The intake end is topped with a hood which hams the circulating air and also acts as a noise control barrier. Air flows down through the high-frequency sound absorbers and into the test cell block.

The engine exhausts into a tail-mounted duct which carries the hot gases to the stacks. The gases pass through low-frequency absorbers and then through high-frequency absorbers before being discharged outside.

• **Coated Rotor.** Most superior technical accomplishment at the Lockland plant was the control room design. Each rotor, mounted between a pair of test cells, is flanked on rubber supports and surrounded by an air blanket.

This isolation from the piping engines send does it so successful that the (slightly) noisy or low conversation, can be heard from one end to the other. You enter the room and get the impression that you have walked into the study of a library. Then you look through one of the windows and watch a J75 starting away within ten feet of you—but you don't hear it.

As a matter of fact, the GE engineers

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assigned to the cells have asked for the installation of valves and speakers so that they can hear the engine start.

From control room to test stand ran about 500 electrical leads for control and instrumentation. Two hundred pressure points led into the recording infrastructure of the test cell. Temperature measurement accounts for another 200 leads.

▶ **Running Engines—GE** had five engines running in test cells for the next-day collection. One of these engines was a venerable Type 1-A, run again after years in storage. After it had been taken out of storage, checked and set up, it fired on the test stand.

In another test cell, a J47-GE-17 was demonstrated with and without solvent. In a third cell, the J73 (which had been the J47-GE-21) blasted away.

There was a fourth engine—the new J53—running behind a closed set of oil doors. It was kept from the press and public relations people, but officials who had been closed for security are the engine. There has been considerable speculation in the press that GE had intended to demonstrate this engine in the keynote of the show, but had to switch to the J-27 instead because of security.

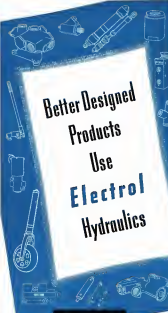
▶ **Strong Security**—Speaking of security, every possible precaution had been taken in the GE factory and test area. Officer walkies and signs had been taken down or covered. In the test cells, every door, gate and control was locked with tape.

Even the designers of the instruments—little placards which showed what they measured—were covered. Overviews directed to anyone, but the official guides used with polite requests to "ask the guide." There were more police around in guards and guides.

▶ **Lockheed Paves**—The engineering work that brought the 1,500-horsepower of the 1-A up to the estimated 15,000-hp figure of the J53 are working on more advanced projects. Many of these are other turbojet engines based on and superintended from today's knowledge.

But one of these is the Aerojet-Nuclear Propulsion project, begun here in a continuation of the pioneering efforts of Pasadena's NERPA project in February, 1951. And to speed the pace, when the first aircraft is ready to fly on the power locked in the heart of the atomic reaction, the engine manufacturer will carry the turbojet, using gas and the waste, "Lockheed Paves."

GE likes to call the jet decade just passed. "The fastest two years in history." There's no argument about that, judging from the recent rate of expansion, and some of the plans that GE mentions, the next two years should be one level higher yet.



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REORIENTING the production building is right view of Plant 6, 10-story Aerojet's East Hartford plant which waits round the dock.

## New Light Shed on Production Picture by Annual Reports

By William Kruger

The high cost to both government and industry of manufacturing a production machine and then trying to rebuild it in a hurry is being spread across the figure tucked cautiously optimistic annual reports of the aircraft manufacturers.

It is more than ever apparent now that 1951 was a get-ready period, extremely costly to both industry and the military services. And careful reading of the reports also gives rise to a belief that 1951 military deliveries were somewhat less than in the previous, untroubled production of 4,500-4,800 planes world-wide.

Money Lack—While the manufacturers were collecting costs, buying and training manpower and getting up materials, production was much crimping along, and the large increases in sales barely managed to cover costs.

The result was that the military was called on for proper priority, that was issuing staggering proposals. One effect of this was to reduce funds available for new contracts and perhaps some aircraft acceptance. This may be another key to the reason for the slowdown.

Aggravating the manufacturers' situation were two other factors.

Government pricing policies, perhaps influenced by Administration and Congressional demands for economy, were cutting manufacturers' profit margins to the bone.

Higher taxes, especially the drastic Payroll Tax, were adding a larger share of operating expenses than the companies admitted as profits.

In 1951 the military services got delivery for planes for the vast areas paid for. They weren't buying planes, in the following analysis, in the winter slow. That was buying programs.

## Lockheed: Buildup Boosts Costs

In the year ending Dec. 31, 1951 Lockheed Aircraft Corp. and a few others, showed a drop in operating profit, but profit and loss liability.

President Robert Gross comments, "This reduction can be attributed to the increased costs inherent in the buildup stage of our program, such as personnel, training, and wages, but also, partly to the construction program carried by government agencies for modernization of public space facilities here and there."

In Lockheed's case, a 75¢ rise in oil prices cut on a percentage of increased pushed 1951 profit before taxes down to \$9,842,800 as income of \$21,199,361 against 1950 profit before taxes of \$15,057,279 on income of \$47,116,919. The resulting tax liability dropped from \$7,897,265 in 1950 to \$4,048,517 in 1951.

Light Right Build—Few reports noted to day, as those plants, 24 contractors could be that either U. S. military production in 1951 was the lower than any aircraft yet made, or that the Lockheed report is discussing deliveries only as distinct from production.

If the 24 General and Super Comets were more than one-fourth of Lockheed deliveries, total deliveries would

be something over 240, with 216-plus being military. That is a great deal different than the 750-800 planes which would be one-fourth of the estimated 4,500-4,800 military aircraft deliveries believed produced last year.

George Baggett-Tac Lockheed is not so convincing on other reports. Building at the Georgia division, where the B-47 bomber will be produced, is \$493,700,000. Part of that building is for the modernization of B-29 bombers. The task was completed in December. At the end of the year, Aerojet's employment had passed the 10,000 mark.

Meanwhile, look for the B-47 now being put in place and orders for replacement. Actual production is expected to begin in the second half of this year. According to previous information, the first Aerojet B-47 is due in April or May, of 1952. Lockheed says the B-47 orders have been increased, but the time to produce them has been extended.

The report sheds other light on Lockheed.

It is important work in the past two years has cost Lockheed much. \$190,000 "in developing a basic design that we feel will meet future needs of the military and the military," although the company says it does not yet have production orders for such a program.

Breakdown of sales was 80% for the Air Force, 15% for the Navy and 5%

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for company's commercial customers.  
 • **Backing** at the end of the year was \$470,415,000, but customers being negotiated would push it to \$1,118,500,000, higher in the company's history. More than \$1 billion represents business for the Columbia division.  
 • **Transport backlog** is \$152 million for BENT and Navy versions of Super Con-

quest and Conquest, and \$115,721,000 for 75 commercial Super Conquest for two airlines.  
 • **A new** Navy design, still restricted, was one of two competitors won last year. The offer was for the Air Force's custom-said cargo transport, XC-146, to be powered by four Allison T-56 turbo-prop engines.



NEW BUILDING at Wichita shows B-47, both key points in Boeing's expansion.

## Boeing: Rising Progress Payments

The report of Boeing Aircraft Co. denotes a good example of the industry's situation last year, although there was one bright spot in the company's operations. Boeing says its "largest program" was awarded from a customer-fixed fee contract to a fixed price basis. (This apparently is the B-47 project.)

Under a CPTT contract, a manufacturer expects profit at a percentage. Under the fixed-price deal, profit is not charged up until actual delivery. So the situation of most manufacturers was compensated for Boeing. The company's own work on the B-47 is under stress to be progressing nearly, ending up millions of dollars in cash and materials. But deliveries have been slowed by delay of some Boeing design not made.

So Boeing's balance sheet for the year ending Dec. 31, 1955, shows charges on military work of \$132,345,101 and payments against those charges of \$204,240,677, net a profit of which had gone into the sales account by contract. At the end of 1955, the company's balance sheet showed only \$12,345,195 worth of work, in progress with an offset of \$10,152,000 in progress payments.

Boeing's sales and other income for the year totaled \$37,457,078, compared to \$367,543,342 in 1946 (Aircraft News Mar. 31, p. 7). Profit had been \$7,444,751 after taxes of \$37,700,000. For 1956, profit rose \$10,

\$35,538 after taxes of \$15,400,000. The result of Boeing's operations clearly shows the effect of rising costs, the government's low profit margin policy and what happens when a manufacturer must carry millions of dollars in deferred accounts rather than paying the money into sales.

Boeing's President William M. Allen points out in the 1956 report that a year earlier he had predicted that 1955 operations would yield a lower rate. Now he says that 1955 should "show more favorable improvement." Here was the Boeing picture at the 1955 year-end.

- **Backing** was \$1,155,000,000, not in cash but in interest for which interest has not been negotiated. About 47.5% of the backlog comes CPTT contracts.
- **Fixed-price expansion** had cost \$12.7 million up to Dec. 31 and this year Boeing expects to spend \$14 million additional for this purpose.
- **CPTT orders** have been increased and production will be stepped up over the next few years. All new contracts on this type of plans will be for the KC-97 tanker version which can be converted quickly for transport as cargo transport.
- **B-47 production** is ending, with only a small number remaining to be delivered.

- **B-47 modification** will be undertaken at Taconut under a subcontract granted by Boeing to General Electric Aircraft Co. Boeing is leading personnel and knowledge to start the program.
- **Boeing** got turbine engines have

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turned up a case field of business. Substantial orders are in the books at Northrop, with more expected. Principal work is in transportation, although the Navy has awarded Kansas Aircraft Corp.

a contract to test a Boeing gas turbine engine in a helicopter.

Employment has passed the 50,000 mark. Average employment during 1951 was 47,000, 50,524 in 1950.



ELMST aircraft production line in 1951, F-84Gs move through Republic plant.

## Republic: Buildup Yields Planes

The story of how a company since the double its employment, opens a network of subcontractors around Los Angeles, and still builds up to high production all in one year is the tale told in the annual report of Republic Aircraft Corp.

Republic had a little more than 5,000 employees during not only the 1950-51 fiscal year but also in 1951. In the end of 1950, employment was up to more than 7,000. At the end of December, 1951, more than 35,000 workers seemed in the firm's employ.

The subcontracting had been planned previously, but not set up yet. At the end of last year, Republic was dealing with 2,120 subcontractors and suppliers.

Production rates, of course, are checked, but a line through the Republic plant in conjunction with the amount of the annual report seemed to show that monthly production now is at least 50 planes, and perhaps even higher.

Despite this record, the Republic story is much the same as that told in the other reports in that its high demand charges and low profit rates are encountered.

▶Balance Sheet—The Dec. 31 balance sheet shows \$77,436,839 worth of inventories and work in progress, against which progress payments totaling \$55,452,165 had been received.

Income for the year was \$130,440,552, more than double the 1950 record of \$47,713,432. But 1951 net after taxes of \$5,144,306 was \$2,014,611. In 1950, taxes took \$2,260,000, and net profit was \$2,355,000.

Republic's stepped-up business could mean that inside the year, but only about half a million dollars more in profit.

When the American people turn to the aircraft industry in a period of "conservation," President Maury Pyle says, "they will expect it not for a prototype of a superior plane but for hundreds of perfectly functioning aircraft rolling off the production lines." This means that the industry has an obligation to have in operation vast and complicated production facilities, the purchase of which must be financed.

It is by getting these production facilities, both plants and people, that it is so ready and confident at the same time Republic was increasing its production.

The company opened up an office in New York City to have about 150 engineers. It leased a 216,000-sq-ft plant at Port Washington, L. I., a 40,000-sq-ft building at Greenvale, L. I., and a 150,000-sq-ft plant at Mineola, on the tip of Long Island. It started construction of 40,000-sq-ft at its El Segundo, Calif. plant.

▶Employee Training—Republic set out to use its engineering advantage by in-

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CLIMBING EMPLOYMENT, illustrated by the Republic steel, boosted all companies.

ing construction engineers and training them on the job. By the end of the year, it had absorbed 493 new engineers. Production workers were trained in a new branch of the Gary Jones School of Association, near Planning city. Of the 3,860 direct production workers hired during the year, 3,340 went through this school. At the end of the year, new employees were being trained at a rate of 200 each week.

Other news of Republic in this report:

• Payroll at the end of 1950 was \$368

million, not including letters of intent which, if successfully converted to contracts, will add \$249 million more.

• Final R-440, which will be the last aircraft, and current production model is the single-engine R-54G.

• Production of F-94 and B-57 is scheduled to begin late this year, although observers believe that lack of Wright J-65 engines may delay this date. (The F-94's now being built have built-in engines).

• Subcontractors produced 40% of the R-54.

## United: Working for Taxes

Tearing up, turning a load of new engines and other tools are reflected also in the report of United Aircraft Corp. for the year ending Dec. 31, 1951. But UAC retained its place at the top of the industry with a net profit of \$14,260,867, an increase of more than \$1 million over 1950.

Increase in sales in 1951 over 1950 was proportionately much greater than the profit increase. Total income in 1950 was \$46,871,383, against \$15,679,874 in 1950. But the tax loss carried from \$12,997,797 to \$16,999,775. That tax loss increase is shown as a substantial amount to be absorbed even by a company of United's size.

While that amount was being taken out of profits, UAC was putting to work nearly 13,000 new employees by last employment to 43,947, and putting more than \$15 million into new facilities. Despite progress payments from the government of \$98,794,555, United's working capital deficit, the year dropped from \$39,974,814 to \$50,443,715, and it now seems to have \$25 million of a line of credit of \$60 million.

• J57 Lead Time—One of the reasons United suffered such a drain on its resources is indicated in the personnel report that accompanies the company's annual statement. It is stated that the lead time on the Pratt & Whitney J57 jet engine, from conception to test approval, was five years. As study on the engine began in the summer of 1946, that would place the end of the initial lead time at last summer.

The report then says that the "period required to bring an existing jet engine into quantity production is generally estimated to be from 18 to 24 months." That would mean that at the outside, the J57 is still more than a year away from high volume output that will start to yield large sales to the company and its licensees.

That fact is significant in regard to the Air Force's building. The J57 is to power the Boeing B-57 and Convair F-60 strategic bombers, one or both of which is expected to replace the B-36. Further, the report states the J57 is to power two new Air Force fighters which are not identified but which must be the Convair F-102 and North American



**Versatility Unlimited**—With the recent addition of the big, new plane HO4S Sikorsky to its helicopter fleet, the U. S. Coast Guard is in a better position than ever to carry out the wide variety of missions for which it is justly recognized. Almost as soon as they were delivered, they were used by Coast Guardsmen to search and rescue, to investigate a man-of-war from high in the Berris and to save five survivors of a bomber crash in Washington's Olympic Mountains.

Ever since 1945, the Coast Guard has pioneered in the

use of helicopters for search, rescue and other missions. With the continuing improvement in helicopter performance provided by Sikorsky, this versatile type of craft has become indispensable to the Coast Guard.

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►Fairchild Aircraft division, Huntington, Md., has selected Calson Corporation Co., Elizabeth, N. J., as the major contractor for its proposed \$7-million expansion program, bringing production floor space to 300,000 sq. ft.

►Flintcon Corp. is now name for former Chicago Metal Heat Corp., Maywood, Ill., maker of flexible metal hose, aircraft parts and other applications for industry.

►Goodrich Aircraft Corp., Akron, Ohio, has started output of Republic F84H subsonic and supersonic under subsonic. Work will soon well into 1955.

►Kierulff-Williams Co., Cleveland, has secured an exclusive manufacturing and distributor's license from Northrop Aircraft, Inc., covering the latter's Real Power 871. 54W will make the next generation power in Chicago, Los Angeles and Oakland.

►Lox, Inc.'s California division will get up a 200,000-sq. ft. building on Cerritos Blvd. adjoining the southern section of Santa Monica Airport.

►Lumcomb Algonic Corp., Garland, Tex., has let contracts to enlarge its main factory building and process building by 85,000 sq. ft. of floor space.

►North American Aviation, Inc., Los Angeles, has leased over 2,400 sq. ft. of factory space in Culver City, Calif., to handle work for its electro-mechanical department, which designs and develops automatic pilot, fire control and navigation systems for aircraft and missiles.

►Percival Aircraft Co., Cienega Heights, Fla., has signed a two-year lease for the entire 30,000 sq. ft. of factory and office floor space in a building which the firm had partly leased since the spring of 1953.

►Raytheon Metals Co., Phoenix, Ariz., will operate under contract a 400,000-sq. ft. addition to its present plant to house two large pieces for slugging and broaching sections—cost of 12,000 ton capacity and the other 3,000 ton. The facility will be built and owned by USAF.

►Rhodes-Lewis Co. aircraft accessories outfit, has occupied a 30,000-sq. ft. plant at 6151 W. 38th St., Los Angeles, and transferred most manufacturing operations from its former Culver City location.

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Lockheed's new Safety Engineering Building, for example, houses a simulated aircraft headquarters, where engineers devote into such subjects as stress research, pilotless aircraft, jet transport and advanced engine design.

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Lockheed's advanced laboratories go to work in the new Research Center, which includes an atmosphere laboratory, testing laboratory, wind tunnel, electronics laboratory, weather laboratory, chemistry laboratory and hydrodynamics laboratory. Here, scientists check the effects of every kind of weather on every vital plane part—shooting bullets into engine bearings, getting tropical fungus on wiring, building acids on on landing edges. Tests, and hundreds of other scientific tests, make in greater dependability in Lockheed planes.

Another advanced building at Lockheed is the massive Hall of Gases, which contains the nation's largest industrial equipment for building research.

The new designs and methods which are developed almost daily at Lockheed are necessarily classified today. When they can be released they will go down in history along with the many other Lockheed engineering feats.

## Subcontracts Face Strangulation

- Labor Department proposes that prime contractors make their subs conform to Walsh-Healey Act.
- If new regulations go into force, primes would find subcontracting a hindrance rather than a help.

### By Harold Medley\*

The Labor Department has proposed new regulations that threaten to tighten the intricate contractor network making it more difficult to spend the defense effort.

Thus the Walsh-Healey Act moves into the manufacturing industry, long left out since 1936. Aircraft manufacturers' leaders with the act in the past have been one stage downstream, two of which have been made since the act was passed in 1936. The first, there is an effort to broaden the coverage of the act. The second is to have a much more serious impact on the industry than that of the wage determination.

Under the act, contractors and subcontractors must agree to the act's provisions and the industry should be in keeping the act's provisions except from the major effects of proposed new Walsh-Healey regulations. The regulations will strengthen the contract relationship between prime and subcontractors as well as the present military aircraft production work to such a large extent.

On May 4, 1957, the Federal Register published a set of proposed General Regulations for the administration of the Walsh-Healey Act. These regulations will become effective July 1 unless revised or postponed. However, as things stand, the industry has already been faced to many objections.

The following two provisions of the new regulations are the ones of the greatest importance to the industry.

- The prime contractor will be charged with the duty of obtaining compliance by the secondary contractor . . . to the same extent as if he performed the work himself" (PL 101-161, 161-170).
- The prime contractor "shall be liable for any failure by the secondary contractor to observe the requirements" (PL 101-161, 161-171).

Chief provisions too, can affect the industry. For instance, there is one in "Integrated Enterprise" which will force an integrated, capital, or account relationship with the industry use of its own materials or parts for the aircraft.

\*The author is a frequent contributor to Aviation Week, Inc., or has been, according to the Walsh-Healey Act of the industry. He is a member of the industry. He is a member of the industry. He is a member of the industry.

product to apply the provisions of the Walsh-Healey Act to those of his employees who make the aircraft and parts as well as those engaged in the manufacture of the ultimate product.

This may put such a manufacturer under a severe disadvantage compared with his competitors who can buy aircraft parts from manufacturers not subject to the aircraft determination or even not subject to the Walsh-Healey Act at all. Yet, the potential gains of the "padding" and "padding" provisions are so much more serious that they deserve the same study.

### Purpose of Regulations

According to General B. R. Rife, a legal expert on the Walsh-Healey Act, the main purpose of the new regulations is to require the industry to continue to strengthen its law but that will be, responsible for seeing to it that all persons who work on the contract (with some exceptions) be discussed later) will work under conditions which conform to the wage-hour standards of the Walsh-Healey Act, whether or not employed by the contractor. Rife believes that this requirement is much further than the language of the law calls for.

• To Prevent Economic Regulations aimed to curb the act were designed to prevent curbing of the act by buyers who would obtain maximum benefits and then have the entire work performed by some other employer who would not be covered by the act. Yet, says Rife, some of these old regulations were designed to impose coverage upon "secondary contractors" as the law is worded in the proposed rules.

It was taken for granted that a manufacturer had no concern with labor conditions at the plant of his supplier, as the performance of his government contract, he did the same thing with respect to the purchase of materials in component parts as he would if he were fabricating the entire product. Contractor. Questions were raised about this and the Administration of the Public Contracts Division moved a ruling which was after the act was passed in 1936 which is known as the "second ruling" passed in 1936.

Under this ruling, if a manufacturer, contrary to usual practice, sublet a portion of his government contract to another manufacturer, the second man

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### About Subcontracting

Subcontracting, which the so-  
called "big boys" would  
be destroyed under proposed  
regulations for the Walsh-Healey Act,  
is perhaps the most important  
single factor in the present mobilization  
program. The program  
consists of expanding the base  
for production, rather than re-  
sponding to expanding production  
in our own production.

Subcontracting brings more  
firms into production manufacturing.  
A thousand firms can build what  
one firm can't. You get greater  
production faster than if a few  
firms tried to run central a great  
deal. How extensive present sub-  
contracting is can be judged by  
these few examples:

- Republic—Uses 1,200 suppliers  
who produce 40% of the 1944
- General Motors—About 50% of 1943  
production was obtained from  
outside sources.
- Lockheed—Uses 1,600 subcon-  
tractors and suppliers who have  
received as much as 51% of one  
plane. Lockheed is building.
- General Electric—Uses 4,000  
subcontractors as its job ex-  
pands.

get to the point and finally pro-  
visions of the proposed Regulations.

### What It Would Mean

Let us pick one of the smaller West  
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a company with 15,000 employees and  
1971 miles of research more than \$100  
million. To get the overall impact, the  
story would have to be multiplied easily  
50 fold—that can be imagined.

Our subcontractor has today about  
4,000 subcontractors, located in 42  
foreign states.

After July 1, 1952 the government  
would have to cut each new contract a  
regulation (many others) that the  
contractor will supply all primary  
contractors for the materials and articles  
contracted for in fulfillment of a  
government contract subject to the Act.

• **Stop-Trip With Men Type**—But then  
would only be the beginning. The  
prime contractor would have to provide  
give all of his 4,000 subcontractors, if  
he wants to keep doing business with  
them under future contracts, to find  
out if they are "secondary suppliers" under  
the regulations. If they are, they are  
not covered. But it is not easy to  
find out if any of our 4,000 subcon-  
tractors are except. Our subcontractor  
isn't double or triple.

He has to write 4,000 registered let-  
ters to the Administrator, "telling forth

## a few words about alloy steels



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to one of the alternate alloys that he could get. And instead of the problem of  
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the contract as contract had number, the commodity called for by the contract, the work to be performed by the secondary manufacturer or supplier, and his understanding of what the regular practice is in the industry with respect to the specific commodity involved."

It is hard to see how one commodity buyer could possibly do this without shifting a large percentage of its staff to composing letters. Yet, if he can crack, the Administrator shall surely hear within 15 days if the regular government rule applies or not. If the Administrator is unable to do so within 15 days, he shall so advise the supplier and "may" authorize him to consider the subcontractor not covered."

Let us now assume that half of the 4,000 subcontractors are thus considered "regular suppliers" and not covered. The real trouble will start only now with the 2,000 which are covered.

•From Producer to Policeman—First of all, the paper contractor will have to ask himself if he can possibly afford to deal with these subcontractors. He would have to judge them, the regulations are specifically that "the contractor is charged with the duty of obtaining compliance."

With he be able to seal inspection to 2,000 subcontractors in practically all states of the Union to check the books, to see that overtime regulations are followed, that no boy under 16 and no girl under 18 is employed, and that



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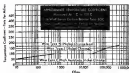
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## AVIONICS

### Pilots Back Approach Couplers

- IAS speakers say all-weather operations possible with devices and techniques now in existence.
- And automatic approaches through hook-up between ILS and autopilot is one of the keys.

By Philip Kloss

Most of the devices and techniques necessary to improve all-weather operations are in existence today, and need only to be standardized, improved, evaluated, and put into operation.

This was the consensus of 11 main panel of experts participating in a symposium on All-Weather Operation Problems at the recent annual convention of the Institute of the Aeronautical Sciences in New York City.

The panel didn't dwell on the prospect of all-weather flight in the literal sense of the word. They did discuss means of improving what might better be termed "low-visibility operations."

However, in a paper presented earlier, Capt. James Asmus of the USAF's All-Weather Flying Division said that it is now possible to control aircraft automatically in all weather conditions except for actual takeoff and landing.

And he later made advance to autopilot-based approach couplers will permit automatic landings.

It was generally agreed that major improvements would come from the adoption of:

- Automatic approach coupler for autopilots.
- Improved approach and airport lighting.
- Improved automatic or remote-control landing of air traffic.
- Airborne radar becomes the improved ground radar systems and positive aircraft identification.

■ **No Solution**—A problem which was much discussed without recommendations for a cure was that of tower control coupling and visibility which often don't jibe with what the pilot actually feels during his approach. Couplers and visibility may be considerably better in some than reported.

The resolution was generally attributed to Weather Bureau reports which don't keep pace with rapidly changing conditions, and to the fact that the pilots' short visibility at approach altitude may differ considerably from ground-based observations.

Considering the wide divergence of

reports represented in the panel (the Royal Navy, CAA, active pilots, airline management, airport operations, equipment manufacturers, and computer aircraft owners) there was surprisingly little sharp difference of opinion among panel members. Capt. L. V. Redman, USNRA, president of Associated Universities, Inc., served as panel moderator.

■ **Other Suggestions**—The most all-weather program for improvement was a two-part one proposed by Capt. E. A. Corbell, American Airlines pilot. In addition to those previously cited, Corbell suggested:

- Improving two airport systems for ILS-TCA approaches from opposite directions.
- Wider use of height and non-precision flights to gain experience and reduce mishaps if ceilings lower than 300 ft.

■ **New Design**—Combination passage-lodging ramp designs to permit clearing the plane from the clouds while the aircraft is in the clouds.

■ **Standardized** cockpit instrument by net, controls, and lighting.

■ **Improved** and simplified cockpit techniques for all-weather operations.

■ **On the** fact that tower control at a low height-visibility airport.

■ **Establishing** a working field group in the Air Coordinating Committee to clarify future all-weather developments and techniques in civilian, commercial and experimental fields.

■ **Auto-Approach Couplers**—The percentage of actually needed all-weather approaches could be greatly reduced if aircraft were equipped with autopilots and automatic approach couplers. The auto-approach coupler converts signals from ILS resources into signals which cause the autopilot to fix the airplane down the ILS "beam." This was the opinion of Robert Ray, head of flight operations for Sperry Gyroscope Co., one of the pantheon in the field.

Ray agreed that efforts be devoted to reducing manual approaches at airports above 300 ft. instead of concentrating operations at lower ceilings. He felt that this would pay bigger dividends, in

terms of improved all-weather operations.

To prove his point, Ray presented data obtained from a post CAA Sperry analysis of records of more than 15,000 pilot-down situations. ILS approaches in the No. 1 CAA Region (Boston, New York, Washington, Richmond, etc.) over a two-year period (November 1966-Dec. 31, 1967, p. 56).

■ **Mixed Approaches**—10% of the DC-8s made their first approach under 500 ft. ceiling, 1 mile visibility conditions. The percentage of DC-8s went up to 21% for 500 ft., 4 miles and up to 50% at 400 ft., 4 miles.

Using auto-approach couplers, Sperry believes that the margin could be cut to 1% for DC-8s. This is an improvement (10% concentrated approaches they have made in a test plane equipped with an autopilot and coupler. All flights have been made with ceilings of less than 300 ft.).

■ **TCA Couplers**—Later, in a statement from the floor, Mr. Ron Baker, chief test pilot for Trans-Canada Airlines at Montreal voiced similar enthusiasm for auto-approach couplers. TCA has conducted tests of their own, using a North Star. Three tests indicate that automatic approaches can be made more safely with a 500-ft. ceiling than can pilot-based approaches with a 300 ft. ceiling, according to Baker. TCA is believed to have made the tests with an Edgewise-Pitts autopilot and coupler.

Baker did state that their tests indicated that the ILS beam was not at present satisfactory below 100 ft.

Earlier, in a paper presented before the convention, Capt. Asmus had shown the results of tests conducted by the USAF which concluded the greatest percentage of automatic approaches occur manually below approach.

Considering his previous statements on the merits of auto-approach couplers, Baker's conclusion seems a bit of a surprise. He stated that he didn't feel that ceilings should be lowered below 200 ft. even with automatic couplers. He felt that the pilot should always retain enough altitude to permit a safe pull-up and go-around if necessary. Nor did Ray see the economic justification of automatic landing (three- or four-engine aircraft) couplers for use on airports, although the military can justify its use.

■ **Challenge**—Panel member John P. Gull, chief pilot for Eastern Air Lines took issue with Ray's figures on manual ILS approaches. Gull thought that EAL's experience with DC-7 at Newark had been better than indicated by Ray's figures. Gull suggested that the figures included reports not equipped with adequate approach lighting. Gull

also questioned whether the pilot's control ceilings were actual ceilings. Gull suggested the possibility of using





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find many applications because the input signal impedance can vary between a dead short and 10 megohms without affecting its operation.

Advantages claimed by the manufacturer include long life under rugged usage, and instantaneous operation without warm-up. Both are attributed to the use of the new solid cathode tube. Although designed for use with 50-cycle power, the manufacturer says the device will operate equally well on 400 cycle power between -50°C and 71°C.

Healy Electronics Co., 57 Wilcox St., New York.



## Germanium Means Smaller Rectifiers

A new line of small germanium rectifiers which are about 1/35 the size of silicon-type rectifiers of the same rating, according to General Electric, is in production by their Lighting and Rectifier Dept. The new germanium rectifier occupies about 16 sq. in. per lb. of output capacity.

The smaller size is possible because of the higher current densities at which germanium cells can be operated. Except for inherent temperature limitations, their size should make them particularly attractive for use in aviation equipment, particularly in magnetic amplifiers which require considerably more per capacity. For maximum life, GE says that cell temperatures shouldn't exceed 55°C.

The new units are being produced in single phase, full wave ratings of 12 v., 25 v., and 27 v., all with 0.4 amp. capacity. Another 6 v./1/2 amp. unit is also available.

GE says the new rectifiers have a high efficiency, with voltage regulation of less than 5%. As with other rectifier modules, the new devices are temperature sensitive, with both reverse resistance and forward resistance increasing as temperature decreases.

The temperature resistance variations of the new germanium modules are not described by GE.

According to General Electric, tests of the new rectifiers at rated voltage show no change of forward or backward resistance in 5,000 hr. of operation.

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## AA Revives Its Airborne Radar Plans

- Purchase of units would aid navigation now.
- And experience will be invaluable in jet era.

By George L. Christian

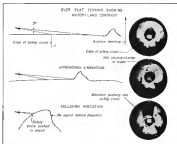
Contracted to assist will have to carry airborne radar, says M. G. Board, chief engineer of American Airlines. Not only will radar improve the safety factor, but it will enable companies to avoid non-remediable weather. Jet transport will not be able to burst into thunderstorms at 600 mph, flying passengers and baggage around the edge. Nor will they be able to afford to fly into them for an appreciable length of time, because of the vast quantities of fuel jet carry. The alternative? See the thunderstorms in radar and fly around them, or through them avoiding the turbulent areas, according to Board.

► **Plan.** Reborn-American, pioneer commercial U.S. overnight and mailer of air service, is now reviving its former old plan to install radar on all of its aircraft. This may cost over \$1.5 million, Board says. (AA had plans in 1949 to install AN-10 radar, but the \$1.5-million cost was too steep for a carrier that is too close to bankruptcy.)

A huge factor behind AA's present airborne radar program is to have ready a potential lightweight and by the time commercial jets dominate the skies—yet with which pilots, engineers and mechanics are intimately familiar and in which all have faith.

The equipment will have to be at least as reliable as today's aircraft radar, Board said, and its purchase price, as volume, will have to be within the reach of all major airlines and most of the smaller ones.

► **Justified.** Now-Board stressed his belief that installation now of airborne radar on current passenger aircraft can be justified as a weather avoidance device alone. The percentage market obtained by avoiding turbulent air detected by the radar will more than offset the cost and weight of installation, says Board. If there are further savings within scope. And avoidance of bad weather, which can cost \$200,000 a winter, is an added inducement. Thus there is the added



AIRBORNE radar picks up a mountain. Top safety circle shows close view. Center mountain shows up in upper part of scope. Bottom mountain's extension into safety circle shows imminent collision. Pictures taken from fully mounted radar.



SOME of modified APS-10 airborne radar equipment used by AA during tests.

potential of radar-assisted safety, because of being able to spot weather in route, and operations as an adjunct to existing navigation and instrument landing equipment so that more than one safety may be used

as an instrument landing ship. When you're down there, Board feels, there can be no keener by any doubt that not only is airborne radar practical, but needed.

Board says that the exhaustive flight



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BRIT. damage to P-51s might have been avoided if plane had been fully equipped.

tests conducted by American (partly under a Navy contract) has proved that the equipment positively identifies the incident even at short distances. Pilots can read their rough area without difficulty, giving them precision a smoother ride while avoiding the evasive plane about to close built up in thick clouds.

To endorse his opinion, Gen. G. C. Wright, Jr., chief of the President's Independence (equipped with a modified APS 50 radar) is saying he had never seen a passenger a rough ride except once—and that was when the jet temporarily failed to function.

American agencies said that other large U.S. carriers have indicated their willingness to go along with AA in investigating actively the possibility of obtaining suitable equipment. And the Air Transport Association is actively supporting the move (Aviation Week Mar. 24, p. 15), having notified other manufacturers of current aircraft involved to work on the equipment.

• **What's Wanted**—There are gaps in the radar's vision as described by American officials.

• **Weight**. AA wants to get the set's weight down to 100 lb. or less. It feels this is a reasonable requirement because of weight restrictions in the art of tube construction and general knowledge of aviation equipment components. Importance of the weight aspect is pointed up by Reed's statement that "on the Conquest, the radar's weight will cause straight out of payload—and that's worth \$25/7b/accuracy—on a \$750 payload factor here."

• **Cost**. Price tag on the sets was originally set at \$44,000. The new letter arrived opened to \$5-6,000. In

addition regarding radar cost was estimated at \$3-4,000.

• **Size**. While an aircraft's limits were established for the set, officials said that it would have to be compatible with the nose section of a Conquest 240. Minimum nose size would be 511 in. diameter.

• **Stability**. Radar sets will have to be gyro-stabilized on both the pitch and roll axes. Pitch stabilization is important to avoid "ground clutter" on the scope when the aircraft goes down.

• **Quantity**. To get the set's price down as low as possible, a bulk order for as many sets as possible should be placed. If most U.S. airlines participate in the program, the number could easily reach 1,000 to 1,200 units, plus spares, according to AA.

American agencies did not reveal who might construct the sets, but indicated that two or three manufacturers had indicated their willingness to consider the order.

• **Key Reading**—American officials did not express any concern about one kind of airborne radar about which considerable controversy has existed the same time, namely radar and radar interception at the same scope.

AA's investigation of capacity of interception was caused up the way several pilots who had never flown radar at even once it before, were briefed on what to do, down the scope, then put into a blind flying cockpit. The planes were taken to mountainous areas and put on collision courses. "We didn't do a pilot take more than 10 sec. to take control course action." Nearly did any pilot complain about interception difficulties.

• **Present Status**—Because of the size of the total bill and the current situation of manufacturers in other structure performance parameters for their sets, American will go into the program slowly and carefully. Probable cause will be to purchase several prototype sets and establish a thorough and comprehensive evaluation program.

At an estimate less than a month ago, this reporter found no aircraft manufacturer part of high aerial defense towards installing on-line radar.

Most of the lack of interest revolved around three points acceptable equipment was not on the market, radar as such, had reached the degree of reliability required by the airlines, and if reliable equipment was available, how useful would it be—would a pilot be looking at it at the right time to avoid disaster or emergency and would he be able to interpret and believe what he saw? American's move should do much to meet this

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dark area, in radar shadows, behind them.

But horizontal precipitation presents precipitation with great clarity. It also stretches the radar's range considerably. Radar areas show up in corners where instrument rain, the "blob" on the scope becoming brighter as the rain gradient increases, the instrument, resulting from a small, AA-developed "black box," shows a black area as the scope shows precipitation intensity in contrast. So pilots dodge black areas and the immediately adjacent light periphery.

• **Peeking the Beam:** Angle of beam projection varies, depending on the job it is to do. For weather surveillance, it should be pitched up 10 deg., a bit for ground collision, 10 deg. is desirable. There is no limit to changing beam pitch in flight.

Beard said there was still some argument concerning which was best to use: manual or automatic. The "K" band did a reasonable good job in locating moisture in heavy rain and also detecting moisture tops.

Problem is that if frequency is too low, slight amounts of precipitation will register on the radar. If it is too high, it is continuously be making areas where turbulence is nonexistent or negligible. If frequency is too high, dramatically rough areas will not show at all up. Subsequent research indicates that the 5-cm. wave length gives optimum results for both weather surveillance and terrain clearance, Wescorber told Aviation Week.

• **Weather Radar—After collision averted,** next issue for Avco group was to tackle the weather-mapping potential of their mosaic device. They were attempting to "give the pilots room to see with during instrument weather."

An APS-10 radar set, installed in the nose of a DC-4, was operated with considerable success through Alaska from December, 1946, to August, 1949, according to AA officials. The set reportedly enabled the pilots to avoid moisture to heavy icing conditions. Some supervised water, where water droplets were too small to freeze, was recommended. But it did not pose much of a problem because the more distant water was less localized and flows through quickly.

Reputation of the ship's ability to bare through rugged weather led the pilot of weather company's DC-4 to ask permission to fly instrument with AA's plane. Weather was reported as full icing conditions. Both planes got through safely, but can be flown around in the middle of thunderstorms, according to AA officials.

• **Avoiding Thunderstorms—Thunderstorm hot lights on a Corsair in the U.S. proved equally gratifying.** Beard



FLIGHTS 701 (lower) shows installed in Corsair 106, used in later experiments.

said. Positive identification of thunderstorm areas momentarily enabled AA's test crew to fly into thunderstorms. The radar brightened the turbulent areas with such accuracy that the ship was easily flown around the rough flying portions.

In test machine, the American Corsair was able to be in almost perfect on-center flight between two simulated cities, picking its way through simulated thunderstorm weather. Despite commercial weather operating in the same area, it found its way out of them very—and many of them still gave their passengers rough trips.

Beard said the tests were so impressive from a passenger control point of view that he felt an entire radar was justified on that count alone.

• **Beacon Navigation—American's radar experts** met behind the problem of radar beacon navigation. For this type of work, a continuous beacon (flashed) was required. This phase of the radar set's capabilities was caused through to the end of the test program.

First project was to determine degree of accuracy with which a plane could be flown between two ground transponder beacons. In a very short time Beard and crew determined that a pilot could determine accurately and distance with considerable accuracy and flights between beacons could be held to precise tolerances. And offset courses could also be flown as accurately as desired for DME and R-Traffic computers.

Since the modified APS-10 set in the Corsair is capable of transmitting either pencil beam or flashlight type beam, the set can take manual navigation, monitor post-reflection and radar navigation in its mode.

• **Supplementary Use—While Beard** stressed that AA is not trying to throw radar in as a "fundamental" navigational

device, radar can do most things other navigational equipment can do, except radar which, in many instances is considerably heavier and more expensive than radar. He suspects, however, that radar will take its place as an excellent supplement to existing and coming low speed equipment.

Beard indicated that with the use of transponders because modified to use American's "delayed pulse technique," its accuracy is a "potential" instrument leading step.

• **Delayed Pulse—Here is how Beard** explained instrument leading step: "A plane wants to lead at an airport equipped with GCA and ILS. But wind and weather conditions act such that the one instrument runway of the field cannot be used. One of the field's other runways is acceptable from wind conditions, but has an instrument leading aid. A one takes two radar beams out to the acceptable runway. Pilot radar set approach on the ILS of the existing instrument runway. Then, above clearing envelope, he picks up the instrument leading aid and transmits into position to set down on it."

The delayed pulse technique enables him to use his radar scope the head-end of the runway he is being directed to, to become one or more. "If he has been delayed, therefore show up at an expanded distance from the other planes being vectored by the beacon. The "delayed pulse" is expanded along the axis of the runway, extending well beyond the runway limit. It gives the pilot great magnification of alignment error and accurately tells him the ship's heading. Coding identifies the beacon to the pilot. The whole instrument concept will operate for about 15 hours on one battery change, AA spokesman says. Units may also be played in.

Use of such beacon at smaller fields



SCANNING returns and other pilot in Corsair, used. (Flightline now over at left)

not equipped with ILS or GCA would enable pilots to "lead" ILS type of flight instrument conditions. An Avco-Raytheon-Bend company has one for delayed pulse radar instrument leading machine. "See Scan," using delayed pulse techniques, made 14 on occasion approach at Corsair report with a 310 ft. ceiling. He was always in position to land. That is related flight. I day anyone to duplicate such a performance on ILS.

Beard admits that radar as a primary means of instrument leading is a long way off. It could never be considered in itself until two complete radar sets are built on the instrument as a standby—and that will not be for some time to come. The intent that he is not proposing radar to replace ILS, but merely as an adjunct to it. A lot of work with the GCA would have to be done before it could be put to any practical use.

• **How It May Grow—This is how AA** thinks the radar will be installed and used in its DC-4, its machine. Two scopes at least 6 in. in dia. will be installed in the left and right-hand corners of the instrument panel, in the direct horizon, to avoid sunlight blinding that the picture. A point to consider is that radar needs will be used when the sun is shining brightly. Just before daylight penetration is a start and it will be the same, AA says.

It will not be necessary, normally, to observe the scope constantly. Nor will it be disturbing to the pilot actually flying the airplane. Whichever is not flying will scan.

Although there are still many miles who take a dim view of weather radar, its capabilities and potentials, American Airlines division is to pursue the subject actively will undoubtedly cause many more corrections and measures to "increase their position."

# ?

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## NEW AVIATION PRODUCTS



### For Lighter Seats

A special lightweight cushioning for aircraft seats, called "Aircraft-Teknion," has been developed by the Sprague-Rohrer Products Co., Shelton, Conn.

The product is produced by compressing without actual heat fibers with fibers from the company's patented Teknion process. Aircraft-Teknion is estimated to be about 20% lighter than standard latex foam of comparable compression range.

A wide application of the cushioning is in new Taurus and Skyliner seats produced by the Aeroflex Corp. for Pan American World Airways new "Super 6" DC 6Bs now being grounded for trans-Atlantic coach service (Aviation Week April 7, p. 30).



### Plane Grommet

A new cable grommet for bulkheads and firewalls, developed especially to overcome difficulties encountered by aircraft manufacturers with other type grommets, has been announced by the Continental Diamond Fiber Co.

According to the company, "aircraft manufacturers" were having trouble with assembly trouble with existing cable grommets. ... It is claimed the new one won't bind, it can be fixed, it's hot. And it speeds assembly, too, according to the maker. It is fabricated from a tough, laminated plastic that swells out and holds tight against the grommet hole in the bulkhead wall.

This is the way the new part is made and works. Processors create Diform rolled taking it out into rings, then

ground and beveled. A diagonal slot allows the bulbous tension of the ring. To mount in the bulkhead hole, it is engaged and overlapped to transfer the normal diameter. Once in, it springs outward, tight against the edge of the hole.

The new grommet also is mechanically and dielectrically strong, resistant to high heat, hot oil and corrosive chemicals.

Continental Diamond Fiber Co., Newark, Del.



### Rack Speeds Mounting

A mounting rack, specially adapted to permit extremely fast, clean, efficient installation and removal of the unit it supports, according to the maker, has been developed by the Bristol Department of Westinghouse Electric Corp.

The rack incorporates a hand-operated mechanism which positively seats the unit being mounted, moves it into place and locks it in a single, smooth operation. There's no fumbling or time wasted aligning the unit, with the electrical connections to the unit, Westinghouse claims.

Shutting an operating handle (light footpedal) from open to down causes a pin which supports from the bottom of the rack to rise from its recessed position, engage the unit and guide it into place. The equipment is "effortlessly" disconnected, says Westinghouse, by moving the handle 90 deg. in the opposite direction.

Westinghouse Electric Corp., Aircraft Department, Lima, Ohio.

## ALSO ON THE MARKET

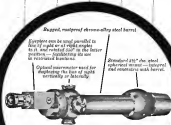
"Conclog" synthetic rubber balloons of newly developed compound can be used for wing covers, engine covers, protecting hot surfaces and no concern for aircraft under Aeronautics Test Program. Material strongly resists tearing, weighs 5 oz./sq. yd., says developer, Valmac Rubber Products, Inc., First Ave. and 53 St., Brooklyn 10, N. Y.

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ALSO SEE PRODUCTS AND FULL LISTINGS IN CATALOGUE ON P. 4. SEE US AT THE CONVENTION

## The Structure of Army Aviation

► **Unleashing Service**—Without a strategic or tactical role, it nevertheless provides the Army with a utility command, external service of its own, without the bother of calling on another service to fill the need. It's the difference between driving your own car and calling a taxi at the time.

If supplies are needed quickly in a particular combat zone, Army issues an rush them to the scene. If some top brass wants to meet the fleet, the Army has its own five-passenger Boeing aircraft available. Observation planes act as shepherd dogs to keep ground forces headed in the right direction and to check on accuracy of

had 1,500 aircraft on hand, both helicopters and fixed wing. Several hundred more are on order. In addition to all-weather and reconnaissance fixed wing aircraft are used to lay down, to move supplies in an emergency, to transport communications equipment. Of prime importance is their rescue service. Engineering, survey, photo-recon and map making are part of their mission. They are also used to evacuate air warfare wounded.

• **Cargo's Role**—The principal means of helicopters in Korea has been rescuing downed airmen, but they have also pitched in to do many of the hardest jobs mentioned above, particularly the transportation of emergency supplies. Cargo helicopters, when they come into general use will carry troops and cargo alike.

Ultimately, the use of behemoths will facilitate river crossings by cutting down on the necessity for elaborate bridge construction. It also is expected that they will reduce the need for tracks and tracking personnel as well as the number of engineers for road maintenance. In time, large swarms of autonomous construction craft are expected.

Army aviation is not organized as separate branches. Instead, it is distributed through the Infantry, Artillery, Ordnance, Transportation Corps, Signal Corps, Corps of Engineers and Armor. Presently, the Medical Corps will have its own aviation units. Each Infantry division has 26 aircraft. The number of planes in nondivisional units varies according to their respective mission.

► **Pilot Training**—The Army's pilots-officially designated as Army aviators—take 11 weeks technical training in fixed-wing aviation at San Marcos Air Force Base, Tex., followed by 11 weeks tactical training under Army auspices at Fort Rill, Okla. An additional eight weeks instrument flying and ten weeks helicopter training—five at San Marcos, five at Fort Rill—are given to selected

Instrument training is comparatively new for Army pilots, but increasing demands for all-weather flying have made it essential. All Army fixed-wing pilots are required for instrument flight.

The scope of Army aviation is bound to increase as new types of aircraft become available. Still a dream, but one which will materialize in the future.

which will rise like a helicopter and fly forward like a conventional plane. Helicopters may also be equipped with jet engines that will power them forward.

► **Copter Companies**—Army Transport Helicopter companies already have been activated. Other formations are scheduled to appear on next Tables of Exigencies.

### Army Aircraft

[illegible]

WILSON  
BARRY

[illegible]

**SOURCE:** Department of Defense,  
Acquisition Work, 4-24-19

Army Aircraft  
Infantry & Airborne  
Divisions<sup>1</sup>

	Female	Male	Female	Male
Domestic Violence, Co-Occurring Substance Abuse	1	0	4	—
Sexual Assault, Rape, Stalking	—	—	—	—
Child Abuse, Neglect	4	1	0	—
Sexual Assault, Rape, Stalking	0	—	—	—
Sexual Assault, Rape, Stalking	1	1	1	—
<b>Total</b>	<b>10</b>	<b>4</b>	<b>10</b>	<b>—</b>

**Keywords:** *child abuse, child sexual abuse, child sexual exploitation, child sexual abuse, child sexual exploitation, child sexual abuse, child sexual exploitation*

[illegible]

<sup>1</sup>Quantities of organic acids in the various divisions differ slightly from the laboratory and air being divisions.

U.S. AIR FORCE  
Department of Defense  
Washington, D.C. 20330

AVIATION WEEK, April 30, 1952

## ALPA Proposes Prop Reversal System

- Pressure relief valve, lever control included.
- Pilot alone could cause prop to go into reverse.

By F. Lee Moore

The Air Line Pilots Assn. believes it has found a simple system to stop uncommanded propeller reversal on hydraulically controlled systems made by Hamilton Standard.

Hamilton Standard plans to complete a test installation of the control system modification about next week. The design is uncomplex but has two months ago-Feb. 25-was a pilot concern with American Airlines engineers David Niles.

Meanwhile, CAA is working up its own detailed study of the problem of uncommanded prop reversal, chiefly gliders from recent industry tests and conferences (Aviation Week Mar. 16, p. 61).

The pilot's program appears more direct than the industry-CAT approach. The pilots get CAA to record the registration that required in-flight prop feathering during check flights. And they have come up with a basic mechanical system to prevent uncommanded prop reversal.

• **Waste Approach-Gliders:** Both Hamilton Standard and Civil Aeronautics Administration said they liked the basic idea of the pilot's proposed modification to the prop reversal system. It was presented to them last month by American Airlines' Capt. G. Dearth. The separate ALPA, on the industry CAA, program to eliminate chances of uncommanded prop reversal.

Hamilton Standard's chief engineer, Carl F. Biles, is studying the pilot program personally. He is also chief engineer David L. Foster, who is preparing prop reversal recommendations for the CAA Administration, and last week that the pilot program looked like "a good, conservative system, but it requires study to decide whether it is practical."

All the pilot-industry CAA activities are uncommanded prop reversal is sponsored by the recent fatal National DC-6 and American Airlines crashes at Elmfield, N. J. Both are now being caused by uncommanded prop reversal, the National crash probably was and the Corson

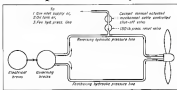


DIAGRAM shows action for feathering out uncommanded prop reversal proposed by ALPA. Hydraulic pressure relief valve (shown near top center) will let off any pressure above normal 150 lb. Pilot closes valve manually to isolate system mechanism.

crash may have been, according to CAA accident investigators.

• **How It Works-Ham** has the pilot proposed system works.

Normal pressure in the prop-reversal hydraulic line is about 150 lb. pressure up to 300 lb. goes through the reversing line to reverse the prop. Electric and governor controls ("brakes") send the system in using pressure through the line; if these controls get out of order, uncommanded reversal may result.

So the pilots take a direct approach to eliminate that risk. Instead of feathering with engine controls in the electrical and governor "brakes" to make them less apt to fail, they propose a relief in the system to stop the reversing pressure even if there is a failure in the controls. A pressure relief valve in the reversing line would let off any pressure above the normal 150 lb., so the 150-300 lb. reversal pressure couldn't build-up, unless the pressure relief valve was properly shut by the pilot.

• **Manual Operation**-And that is the pilot system. When the pilot wants to reverse, he pushes a lever on the cockpit pedestal. This manually closes the pressure relief valve by a mechanical cable that pulls the relief closed. The valve is spring-loaded to stay open.

The pilot would close the shaft valve by a deliberate act-and only on the ground, when he wants to reverse.

The normal open position of the pressure relief valve allows a maximum of 150 lb. pressure in the reversing line. This is enough pressure for all prop governing in the normal range, the ALPA full-power prop spin-up reversing, feathering and unfeathering.

Installation of the valve is made simpler than would be expected, on the rear section of the engine that already is a flanged plug, used for tapping the reversing hydraulic pressure line on ground tests.

• **The Pilot's Viewpoint**-The pressure relief valve and the cable-controlled shaft valve can be made to enclose and mounted on the rear section.

The pilots say they have had to devise the system because aircraft engine and prop manufacturers and the engine have been growing the responsibility back and forth without anything a positive device themselves. That also appear the present trend toward thrusting engine buyers on engine makers.

Under the uncommanded shaft or unfeathering like it is designed now, "more in-flight accidents with resultant losses will occur, and we'll be right back where we started from," says the pilot report. "At least weekly, we see two uncommanded uncommanded reversals on the ground due to electrical and governing malfunctions," the report adds.

As a supplement to the mechanical shaft valve, the pilots recommended a reverse warning light in the cockpit, to warn when the prop blades get to low the low pitch stop setting.

• **Power Blasts**-The prop reversal system is complex. That's why pilots want to control the manual lever. A simplified outline of how a prop reverses.

When a plane lands, weight on the landing gear actuates a solenoid which unlocks the reverse portion of pilot's throttle quadrant. Pilot then can pull the throttle all the way back, actuating



## THE PILOT NEEDED CAT EYES

Even 20-20 vision could hardly see the dimly lit face of old radar screens! The time lost in the pilot's eyes adjusted themselves from a glaring haze-blanked sky to a low-illumination radar screen was too long. In aerial combat life or death depend on instant recognition and reaction.

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Sea-Gro supplies both aluminum and the bronze used in centrifugal castings, as well as bronze sand castings. Send photo, American Sea-Gro Bronze Co., Brevard, Pa.



# TV Tested As Aid To Control Towers

U.S. Weather Bureau is testing balloons, testing approaches of airplanes at Washington National Airport, under an Air Navigation Development Award sponsored by \$10,000. The program is to find how the system can help airport controllers manage aircraft and check existing aid to the pilot controllers it is his finding approach.

The Bureau is using a DeMott meteorological television set.

The TV camera, located at the tower threshold, results in approaching plane at about the same instant it is spotted in the visual of the tower. The TV camera is positioned at the same point. But the TV camera and transmitter send the picture to the airport tower, where approach conditions can be continuously watched and described to incoming pilots.

May Increase Scope—But the problem is to increase that visibility in the approach plane path below, not after, a plane comes into view.

After preliminary experimentation with the TV potential the Weather Bureau met in TV observation at balloons in the approach path. The Royal Aircraft Establishment is experimenting along this line at Farnborough. Flares are fired into the approach cone from varying distances from the tower threshold where the TV camera is located. Also balloons are raised in the approach cone and a searchlight is focused on them from the tower and lighted camera. The observation is continued separately by remote operation, that data is coordinated with that visibility information taken from the TV observation.

Evolution—All of this is in the early development stage. The Washington evaluation program was initiated by Ray Carl Hansen, who expressed an interest in the present design Weather Bureau and ANDR techniques at the

present. Other features Subcommittee hearings on North Atlantic roadhouse. Washington tower operators are being asked also to evaluate use of the proposed approach in use and to the parties control. Another advantage to an approach TV installation is that it can be tested around by remote control to show a pilot's view of tower.

# SHORTLINES

► Air South Transport Assn. has tented plans for a membership meeting in Washington this month. Next will be annual conference this fall.

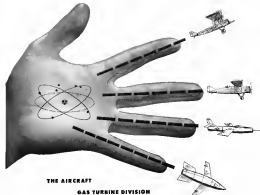
► American Airlines will make jet take-offs next to the tower under its 25 DC-7s was transferred the last American order for jet-powered transport, according to a report speech by the Association Club in Walter H. Johnson, Jr., president of AA president C. K. Smith. The reported jet aircraft, which is a replacement for the 100-100, the latest American's line, of jet and turboprop. There is a similar dispatch scheduled to be raised by local postal work. Also kept into the competitive situation.

► Bonanza Air Lines has tentatively determined that next rate set by CAB at \$2,067.185 Dec. 15, 1949 Sept. 15, 1951, \$643.355 Oct. 1, 1952 Dec. 15, 1953, and a rate estimated to produce annual total pay of \$535,551 starting next year.

► British Overseas Airways plans ten new and six existing flights a week on American trans-Atlantic schedules.

► Capital Airlines, to help a problem of winning pilots, says in Charlotte, N.C., which is a General Electric engine testing plant.

► Control Airlines is recommended for review of its schedule by CAB public



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## LETTERS

### Wrong Salary

Just to keep the record straight, the total sales received by the water for the fourth quarter of 1958 was \$3,300 and not \$15,300 as reported by Averston Wynn, May 10, 1962 in listing receipts and expenditures of certain industries, groups and individuals registered under the Congressional Lobbying

While my copies of the report show the correct sum for the quarter, one of the six copies of the two-page report that slipped in the typewriter to the second figure appeared in the form a four two eight. This resulted in the actual figures being reported as that for the quarter, hence the confusion is pointing. The paper figure will be passed in a column in the next listing in the Congressional Record issued monthly hence, and is being corrected in the permanent edition of the Congressional Record.

We're a lot red blood because of killing of our friends and an increasing amount of strikes hit road. With American West please that the road with a paragraph on this.

Worm, William  
Associated Training Society  
1025 Connecticut Ave.  
Washington, D. C.

## CAA 'Out of Touch'

Your article in CMA and the memo the Office of Assistant Solicitor has gotten (which says he here will succeed to me) are every one I know in the industry. But I think you, in making this tremendous amount of sense and lucidity, become the people who have been sitting up the present chapter are so out of touch with the mind of business men, that they are driving them—rather than keeping them—where you could do the job expected of an organizer of the CMA.

1. In case all the recombinants that have taken place in GAA have been taken into account, isn't it due to the fact that the ones who have been in charge did not know how to set up a scoring rig? In case that is true, why does the same HaidyDas group always make the recombinants and end up in charge?

2. How many pilots are employed in the Aviation Safety Office would actually make a safe ILS or OCA approach on a modern four engine airplane? I do not mean what their credentials may show on the log, but

3. How many of the writers today are in miserable new reality? Is it a job here enough for them to qualify for this job? Their people today, especially in the same work, are responsible for many decisions that cost more thousands of dollars. I think people would be surprised if they knew how little some of these men know.

4 Why have so many people called in?

decided to leave Washington and go back to the airport, some 400 miles away. Any plane that cannot keep people like Bill Moore and other important people happy when they are away from something means nothing.

My classmates come from several years with CAA as an inspector and later as an other department. I have honestly never been a party to anything that would hurt CAA or anyone, but it seems to me the agency is in hell while the parent group runs things with an iron hand toward the state.

The idea of the maintenance people using these cars that would lose the qualifications they have had to hold jobs paying from \$13,000 to \$16,000 a year. If he, you won't be able to get this from them or range of his experience.

The old staff about not being able to get better qualified people is not true for there are many online people who have each year to take jobs is evidence that you can move from the CIA pay structure but these people do not want to work for people like you.

Phras. ans. with that could also get results, but you are doing one of the best things possible for students.

**Look! No Tail!**

I have heard of the Sayre being sold as head but I strongly doubt that the Northern, Knapton, F70, as shown on the cover (Magnificent Mustangs) of your Jan. 1948 issue can be flown without a tail.

NATHAN H. FINE  
Specimens Section  
Montgomery Electric Corp.  
1214 42nd St., N.Y.C.

## Fairchild's First

Your Mr. 17 was reported as stating that Conover claimed the "first plant in the U.S. constructed exclusively for production of grafted material."

The Franklin-Gould-Minden dream will in my knowledge be the first in larger construction of a plant devoted exclusively to the development and production of grafted material, and work on that plant two years before commencement of the Conover plant.

Secondly, the shop operations have already been moved into the plant and within

the next week or ten days the engineering and office groups will be moved into the new plant. Therefore the Guided Missile Division was the first to start a plant on the last to finish one.

Further, the Gaudet Miller design plant is constructed with Tandberg facilities and is not a government provided facility.

I note, that the plant is not as large as that which is being built for Convair, because the class was that Convair is the first guided missile plant, I would think that with caring to your attention.

S. B. HAYES,  
Public Relations Manager  
Fairchild-Gaudet Missile Div.  
Fairchild Engine and Airplane Corp.  
Parsippany, N. Y.

## WHAT'S NEW

### New Publications

**CAA Seaplane Facility Director** gives data on the number and kinds of landing lanes, services available, fee and location facilities at the country's seaplane bases. Also indicated are obstructions, closed and abandoned sites. Price 10 cents, 30 pages. Write: Dept. of Documents, U. S. Government Printing Office, Washington, DC 20540.

Americanists Distribute Summary, is used annually by CAA, will be sold through the Co-consumers Printing Office. The 1992 Summary costs \$1.50. It had been distributed heretofore through CAA. Americanists Distributors, issued every two weeks, specifying modifications and suggestions necessary to keep this plan smooth, will continue to be distributed free.

### New Course

College correspondence course is available to provide ground school training. It is offered by University of Illinois. It provides three college credit units to those finishing these. Course costs \$15, with books and materials being about \$4-50 additional. With the Division of University Extension, Urbana-Champaign, Ill. for further information.

### Publications Received

• **Industrial Transformer Buyer's Guide**, published by General Electric, Schenectady, N. Y., 1951. Best, up-to-date information on the complete line of General Electric indoor and outdoor power and control transformers.

## ADVERTISERS IN THIS ISSUE

AVIATION WEEK—APRIL 14, 1953

[illegible]

The engineering department that consistently produces the "best" of the 1988 line—R-25, R-31, T-6, now the R-10 Jetco gas series: AFI, PFI, PFI-2, V42.

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## Everything Depends on Safety

Another commercial plant has crumbled into the bowels of a populated New York metropolitan area, once an airport, killing citizens in their homes and on the streets.

Citizen groups are petitioning officials to close both LaGuardia and Idlewild. Newark Airport was closed weeks ago by such public opinion, although the field may never be limited to airline traffic if plans do not fly over Newark and Elizabeth. These citizens are somewhat hysterical, true, but they did close down Newark Airport.

What is the future of airports which are surrounded by built-up areas? There is no simple short-term answer, because one of us once thought that there have been four serious crises in the New York area killing 14 citizens and endangering hundreds. What insurance do citizens have that he won't be next? What insurance can we as aviation give him?

There is a long time answer if we start to work quickly and convince the public we mean business. But it will take more than a committee of individuals from domestic airlines serving New York.

As we sit at this unexpectedly critical New York airport problem that has developed into a full-blown crisis in four months—except for the earlier months of complaint about noise—disastrously and livably needs one more proof that everything in aviation depends on safety. Even consumers!

If we don't start to expand now the proper amount of money, time and resources mental and physical energy, to try to relieve superconcentrated safety in aviation, we shall never come colliding with ever new and bigger problems like this, while still finding our areas over all the old problems we've had with us for years.

But it takes big decisions and big men to tackle this safety subject as it has never been grappled with in the past.

Neither commercial nor military aviation is giving the attention to safety that the subject demands. Our critics for this is a simple lack of resources and understanding of the size and importance of the problem. We've all been going along lip service to safety for years. But if we don't really go all-out for it—government and industry, leaders alike—and pay now for what we should be doing for safety, we will pay the paper money price over in the future.

Let the New York airport emergency be our lesson to us. If we can't learn to be good citizens in the crisis, we shall be relegated to the ethics, sure as fate. No amount of flunkey will change this trauma. It is inevitable.

New York is just one more warning. If we don't realize that everything in aviation depends on safety, we must let the public not only financing us and our plans, but hysterically demanding our standards and reasons from other places.

The airplane is here to stay, but its safety can be crippled and its growth hampered by a belligerent public.

opinion, and a lot of that public opinion is up to us in aviation.

When every subject has a vice president in charge of safety, and when top officers of government and industry and the military services get together constantly on the really big safety matters of design, manufacturing, operation, research and other such subjects, to put the major screws on every phase of aviation and start overhauling, we'll be moving forward with assurance both to ourselves and to the public. There is much to be done.

## Helping Reds Keep Their Secrets

Someone should do a story sometime on how military intelligence officers "think."

Since December, ADAMSON WALKER has held approximately 100 such sessions. The government has learned from detailed analysis of a Russian MIG-15, captured months ago. Secretary Fawcett of the Air Force has told us he believes the data should be printed. Air Force Intelligence appreciated it. Gen. Sanford has repeatedly refused to clear publication of this information, despite Mr. Fawcett.

Now, Look Magazine has come up with a piece entitled, "Russians Don't Even Know How They Do It."

Look says the Air Force "decided the MIG was so good the Russians must have built it by accident. It cannot be released because it might endanger the national security if the Russians got hold of it and found out how they built the plane. They are going to have to have some pretty slick spies if they want to steal the secret from us."

## Meet the Issues, Admiral

There seems to be a rumor that Adm. C. F. Hearn, CNA Administrator, sent all major administrators, Mar. 30 that often one another tip-off to the attitude of CNA toward its faults or critics.

The Admiral's memo copies his telegram to us, one reading that newspaper charges of lesser standing in CNA again were "irrelevant," and that he has "evidence on hand" to prove it. We published the Admiral's was Mar. 31.

Then he tells his staff "Other appropriate steps have been, and will be, taken to counteract the effects of these one-sided editorials."

WHY DOES THE ADMINISTRATOR TALK ABOUT "COUNTERACTING EFFECTS" INSTEAD OF "ELIMINATING CAUSES?"

We trust the Admiral further told his men about his later letter to us, which telegraphed out too neatly our request for his "evidence" and the names of his events going on.

Why don't you let us beguine look at your "on deck" and decide for ourselves what it "proves," Admiral?

—Robert H. Wood



## klystrons AT WORK IN THE LABORATORY

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2K-51	7500-10,390 mc	250 mw

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